INNOVATIVE AND SUSTAINABLE ENERGY IN THE AUTOMOTIVE INDUSTRY

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INTRODUCTION

The world in which we live suffers big and constant changes that affect society as well as companies and the environment. Most of these changes tend to have an unfavorable impact on Earth, and both society and the companies send and receive these unfavorable changes that have an impact, above all, on nature. Focusing on organizations, they should establish pro-active and corrective measures to eliminate these negative repercussions.

In this aspect, the concepts of innovation and sustainability will be linked, as, when put into practice, they can generate an optimal combination in companies that has the potential to lead them to achieve a competitive advantage, differentiate themselves from the rest of companies and achieve their goals. That is why these two concepts can create a great business performance within any industry.

The automotive industry has been the one chosen for the realization of this comparative analysis, because it is an industry that has been evolving a lot in its productive processes and in its offer of products and services. If the productive processes of these companies had not changed to be more sustainable in recent years, they would have had a very harmful effect on the planet, which they have, but to a lesser extent. Society is increasingly involved with the preservation of the environment, so the demand of products that generate a low environmental impact has grown. Car companies, in addition to changing organizational aspects, continuously change their products to emit lower levels of CO2 or even to stop releasing polluting gases. More and more car companies are adopting these changes.

This project is focused on the automotive industry in particular, based on the comparison between five large world-renowned companies and their brands. The chosen companies are Ford, Hyundai, Toyota, Lexus and Tesla. Some of them are large companies with a high commitment to the environment while others have joined the environmental strategy as a way to further innovate. These companies will serve as a reference to understand the evolution of this sector. In order to reach this objective, the concepts of innovation and sustainability will be explained first. Then, the previously mentioned companies will be introduced and their philosophies and products will be analysed. Next, a comparative analysis will be carried out and a set of results will be showcased. Finally, conclusions drawn from this project will be established, together with the limitations of these sustainable automotive initiatives and with future research to be undertaken.

1. THEORETICAL FRAMEWORK

In this chapter we will explain and analyze the theoretical knowledge of innovation and sustainability through the information that has been collected during the investigation of both individual and organizational terms. The information that will be provided below will serve as a basis for understanding the study and its objective.

1.1. Innovation

Innovation is the introduction of a new or significantly improved product, process, marketing method, organizational model in the internal practices of the company, the organization of the workplace or external relations (De Oslo, 2005).

From the business point of view, innovation is one of the most important parts of the process to develop new products or improve existing ones, but it also manages to solve problems that have appeared along the way, reach new customers and find new ways to produce, communicate and design.

It is important to know what "innovation" really means to identify the factors that can influence this concept. That is why the concept will be defined to carry out a more in-depth study.

1.1.1 Innovation concept

There are many definitions by a large number of authors from different fields of study about the concept of innovation.

Analyzing some of them, the one that best fits this study has been selected: Innovation is the set of activities that are carried out in a certain period of time and place that lead to the successful introduction in the market for the first time of an idea in the form of a new or better product, service or technique of management and organization (Pavon & Goodman, 1981).

Innovation is understood as the introduction of new features, the modification of existing elements in the market with the intention of improving or renewing them and the creation of new proposals and inventions implemented both economically and socially.

Focusing on business management, innovation is also the improvement of this management through new processes and the use of technologies, automation and quality improvement in order to satisfy customers. Therefore, through innovation,

companies can achieve greater growth and competitiveness improvement.

The *Theory of innovations* (Schumpeter, n.d.), considers innovation as "the establishment of a new production function". In this theory, it is explained that, with the help of the whole society, the economy evolves when the productive factors are combined in a novel way. In short: through new inventions, economic growth is generated.

To conclude, innovation can be simplified as **the generation of ideas and its correct implementation**. This can be the key to business development and economic growth: investing in research and innovation.

1.1.2 Types of innovation

Everything that surrounds us is generated by a process of constant innovation, so it is essential to know the types of innovation and what their interpretations are.

The term *innovation* is a very generic concept so the classification of the different parameters will be reduced to the business term. For the purpose of making it easier to understand, it will be classified in the following table:

Table 1: Types of Innovation

PARAMETERS	TYPES OF INNOVATION
DEGREE OF INNOVATION	**RADICAL INNOVATION:** Everything about changes completely creating new products, processes, designs, functions, technologies or organizational functions.
	INCREMENTAL INNOVATION: Introduction of small changes to improve the product or service without leaving aside the essence of the brand / product.
NATURE OF INNOVATION	**TECHNOLOGICAL INNOVATION:** The change is generated by science or technology.
	COMMERCIAL INNOVATION: Factors that are directly related (promotion, commercialization, distribution ...) generate the change in the product or service. Eg: implementation of online sales in a company.
	ORGANIZATIONAL INNOVATION: Growth and evolution related to a better use of both material, human and financial resources. Eg implementation of more optimized distribution.
APPLICATION OF INNOVATION	**PRODUCT INNOVATION:** A new product or improved service is added to the portfolio (technical characteristics, new functions ...) Eg: Update of the iPhone Operating System.
	MARKETING INNOVATION: Changes related to design, packaging, positioning, promotions, prices even changing the logotype of the company.
	PROCESS INNOVATION: Use of new techniques, materials or implementation of computer systems to reduce the cost of production or distribution, improvement of product quality or production optimization.
	INNOVATION IN ORGANIZATION: The internal functioning of the company changes due to a new management implementation, a better allocation of tasks to employees, training actions ...

Source: Adapted from Porter (1990)

1.1.3 Innovation diffusion process: Stages

The twentieth century was very important for innovation because the development and technological growth began to progress rapidly and steadily. The *Theory of the Diffusion of the Innovations* (Rogers, 1962) explains the changes that arose with the modernization of society.

According to Rogers (1962), diffusion is the process of communication that aims to socialize new ideas and inventions among the members of a certain time set and through various channels of communication. However, he considered that the concept of innovation should not only be known, but also adapted and familiarized with. Five qualities were established to be able to adopt it:

- **Relative advantage**: It has to be demonstrated that the idea or product is beneficial compared to others which decreases the possibility of risk.
- **Possibility of observation**: Benefits have to be visible or tangible for society.
- **Compatibility**: The context and the reality of society must be adequate to the sector in which it means to be implemented.
- **Complexity**: The degree of difficulty for learning, use and maintenance of innovation must be studied and considered.
- **Possibility of tria**l: It must be possible to submit and test the innovation that is taking place before approval or use.

With most of these qualities, the opportunity for adaptation is much more successful. Rogers, in addition to considering the massive channels of diffusion, considers interpersonal communication and social networks important. To make it effective, it is necessary to join homophile groups with heterophiles: the former have common characteristics, so identification and communication are more fluid, while the latter have different characteristics and can generate new ideas through these differences.
This approach leads to development processes so human behavior has to go through **5 stages:**

Table 2: Innovation Process Stages

STAGES	DEFINITION
PERCEPTION	First approach to innovation where knowledge and understanding already exist.
INTEREST	Development of critical attitudes towards innovation where positive and negative aspects are studied.
EVALUATION	Examine positive and negative points to agree between accepting or rejecting innovation. In case of reject it, the process would end.
IMPLEMENTATION	Set a time duration to test the creation before adopting it in its entirety.
ADOPTION	Confirmation and final acceptance. It is the most significant moment. To be successful, there must be commitment on the part of adopters in the use and maintenance of this innovation process.

Source: Adapted from Rogers (1962)

According to Rogers, the process is long because initially there tend to be a few adopters and some of them give up. However, in the middle of the process the innovation is adopted by the majority.

1.1.4 What is an innovative industry?

Starting in the second half of the twentieth century, manufacture was progressively affected compared to the service sector, although over time the industry has become a major issue for policy in most advanced countries. Countries such as the United States, the United Kingdom and Japan, as well as the European Union, all seek to strengthen their manufacturing, activate the potential and increase employment to ensure that sustainable development is practiced.

The article *A stronger European Industry for Growth and Economic Recovery* (European Commission, 2012), refers to the *reindustrialization* of Europe and defines the objective of reaching a 20 % of GDP by 2020 to recover the levels prior to the last economic crisis. This objective gives priority to the transversal growth of the European Union's policies as a whole (single market, competition, R+D and innovation).

Innovation is characterized by high levels of productivity with effects on competitiveness in the industry, and also by the incorporation of better qualified staff and the structuring of a highly sophisticated and developed ecosystem, which supports business innovation and offers intangible services of great added value for companies. This way, innovation activates sustainable companies that provide greater value in the market and increase the creation of employment, without taking into account the sector of activity. On the other hand, new innovative business models are also incorporated,

focused on the contribution of value with the aim of adding the potential of new emerging technologies that innovate the way of manufacturing and the functionality of these products and services.

Therefore, innovative industry is based on the production of competitive and demanded goods that create great value and allow the maintenance of high levels of well-being, through knowledge and the study of new forms of creation.
In order to maintain an innovative industry, we must not only focus on an exclusively financial economy, but also on the continuous innovation of that industry. The more innovative the industry is, the higher the salaries and the higher the rate of indefinite hiring will be. The more industrialized it is, the greater will be its resistance to economic crises and its preservation of high levels of income and employment. That is why the strongest and most developed economies have a powerful and innovative industry.

The practice most linked to industrial innovation is research and development (R & D). If technological development were displaced, competitiveness and innovation capacity would be lost, and thus the outsourcing of manufacturing activities would make the value of design and technical development decrease rapidly.

In conclusion, for the development of an innovative industry, it is essential to have a clear, intentional and targeted industrial policy, trying to avoid mistakes and excesses that have already occurred. It is important to measure and continuously evaluate and implement a state policy with legal and structural mechanisms that allow the development of innovation and encourage the undertaking of industrial projects.

1.1.5 Technological innovation model

The proper management of technology is one of the most successful and important factors in a company. Technology can be generated internally, through a research activity, or it can be acquired from abroad. If the company intends to achieve and maintain a technological advantage to keep its position in the market, it must constantly practice internal research and development.

The complexity and speed of technological changes creates the material impossibility of generating new technologies within the companies, besides the added difficulty of having to assimilate a system of investigation and development in generic technologies of its own.

The capacity for development depends on a rapid adaptation to changes in the environment, especially the technological one, and on the creation of modifications that favor those changes.

Technological innovation can be of product or process. The **product innovation** can be considered as the improvement of an existing product or the development of new ones with the incorporation of new technological improvements applied to existing processes. This enhancement can be considered direct or indirect:

- **Direct adaptation**: Functional qualities are added to the product to make it more appropriate.
- **Indirect adaptation**: It is related to the reduction of the product's cost through improvements in the company's processes and activities with the intention of being more efficient.

The **innovative process** is based on the introduction of production processes and the modification of those that already exist, with the application of new technologies in order to reduce costs and obtain a specific impact on the characteristics of those products.

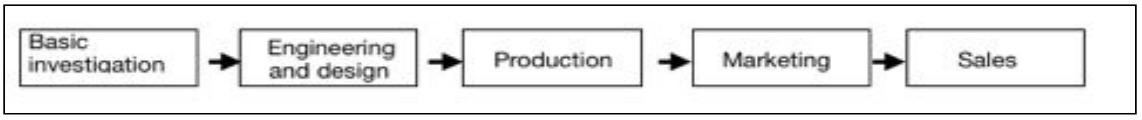
Therefore, the process of technological innovation has to go through several phases which introduce the results of a research into the market with a duration and consumption of its own resources. Each phase must be fed back in order to generate information flows throughout the period between the different activities.

The components of the business strategy have changed, but the conceptualization of the processes of technological innovation, and the focus of its management, have also evolved. According to *Towards the Fifth-generation Innovation Process* (Rothwell, 1994), these changes can be schematized into the following **models of the innovation process**:

1. Technology-push Model

It appeared between 1950 and 1965. Its main characteristic is the linearity of the progressive staggering that begins in scientific discovery, which is the engine of innovation, then continues to research, development and technological manufacturing. It is in the market where the results of R & D will be adopted.

Figure 1. Technology-push Model

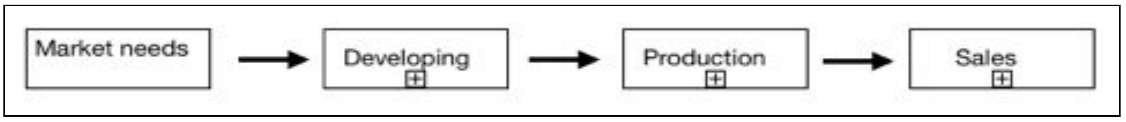


Source: Rothwell, (1994)

2. Market - Pull Model

In the middle of the 60s, the market began to have a more important role in terms of the innovative process, which is why technological innovation, also linear, focuses more on studying the needs of consumers, so the study of the market was the source of generation of ideas to carry out new innovation processes.

Figure 2. Market - Pull Model



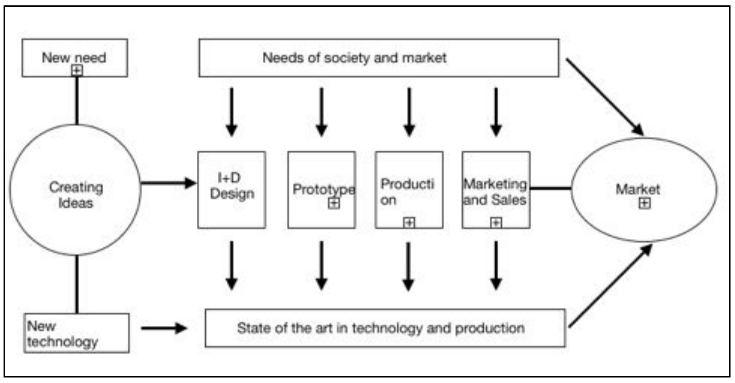
Source: Rothwell, (1994)

3. Mixed Model

According to different models developed (Myres and Marquie, 1969; Rothwell, 1994; and Cooper, 1979), there is a great simplification in the management of technological innovation. A model is created with a more complex process where science, technology and the market intervene.

Rothwell and Zegveld (1985) represent "a logical sequence not necessarily continuous, which can be divided functionally, but with interdependent and interactive stages." Therefore, this model represents a more complex system in the channels of communication that are both intra-organizational and extra-organizational, thus uniting the phases of the process with the market and science.

Figure 3. Mixed Model

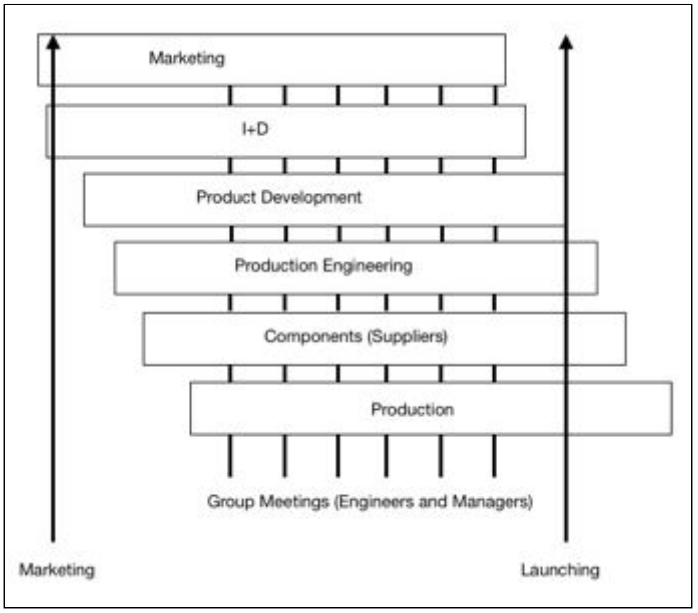


Source: Rothwell, 1994

4. Integrated Model

This model was introduced in the middle of 80s. It considers that the phases of technological innovation must go through simultaneous or concurrent processes as a result of the need to reduce the time of development of the product and be faster than competitors to introduce the product into the market. One example would be the introduction of the Japanese automobile, where the integration of phases in the innovation process was extended, which raised the level of coordination and control during the process.

Figure 4. Integrated Model



Source: Rothwell, 1994

5. Network Model

Currently, it is understood that technological innovation goes from being a sequential process to being a "networked" process, because there is a very high number of horizontal strategic alliances that are based on inter-company collaboration for the

development of innovation (Haklisch and Fusfeld, 1987; Hagedoorn, 1990; Dodgson, 1994).
As such, vertical relationships with suppliers are beginning to be seen as a strategy for small and medium-sized companies to generate a great variety of relationships with large companies in innovation processes (Rothwell, 1994).
The network is expanded, so that specialized clients get more deeply involved in this type of process.

In conclusion, to be able to choose a technological innovation model, it is necessary to identify correctly if the objective is to focus on the product or its process, as well as determine whether to apply more functional qualities or reduce the cost process. Also, above all, it is essential to be certain of what technological model the organization works or wants to function with.

1.2 Sustainability

Sustainability is a social and ecological process represented by the search for a common ideal, in a continuous manner for it to endure over time. It guarantees a balance between economic growth and environmental and social well-being and it aims to satisfy current needs through the care for the environment and social welfare.

People interact directly with the environment, its factors and its resources to achieve actions that do not harm or sacrifice the environment's capabilities.

With sustainability appears sustainable development, in order to progress and maintain the balance generated today without harming or endangering future resources.

1.2.1 Concept of Sustainability

The concept of sustainability appeared for the first time in 1987 with the publication of the *Brundtland Report: Our Common Future* (United Nations, 1987), which warned about the negative environmental consequences generated by economic development and globalization and proposed solutions to face the problems generated by industrialization and demographic growth.

Sustainability "seeks to guarantee the needs of the present without compromising future generations and without giving up any of the three essential pillars: environmental protection, social development and economic growth".

In the corporate sphere, sustainability has gradually become a philosophy, being increasingly a fundamental and essential objective regarding the impact of companies on the planet and the different stakeholders. Thus, companies are also interested in generating value in society and in the world, in addition to seeking and creating economic value.

There are **four fundamental principles** of sustainability for the development of a positive environment that benefits society: **the higher purpose, the integration of agents, conscious leadership and conscious culture and direction**.

Sustainability is an obligation that must occur in all types of companies, with the aim of showing society that it is (and must be) responsible and committed to the environment.

Likewise, sustainability is not only present in large companies, it must be integrated in the same proportion in small and medium enterprises so that it is used and promoted as an improvement in business operations. This positive contribution to society makes them more efficient while creating greater benefits.

1.2.2 Types of sustainability

The concept of sustainability is approached as human decision-making actively seeking for the environment and existing resources to not be destroyed. Sustainability appears as a response to the excess of human activities over natural environments.
This concept can be applied to any space or activity, such as environmental sustainability, social sustainability and economic sustainability:

- **Environmental sustainability**: Any relationship with the environment must not lead to the destruction of the environment which creates a *sustainable* long-term relationship. So when it is said that an activity is environmentally sustainable, this means that it has a negligible impact on the environment from the perspective of natural resources such as water conservation, animal and plant richness and diversity, quality of the soil, etc.
  Example: ecological tourism that does not renounce to its activity, but does not degrade the environment either and it can also be maintained in the long term.
- **Social sustainability**: A sustainable approach is added to the way of life of a social group. It focuses above all on the social sectors in a situation of vulnerability or disadvantage with the aim of guaranteeing that human activities

are carried out without destroying the affected communities, achieving long-term lifestyles.

Example: agricultural sector and crafts. Activities that are directly related to rural communities and create immaterial wealth of great social value.

- **Economic sustainability**: Use of economically profitable practices to also be socially and environmentally responsible and ensure an equitable economic growth that benefits and creates opportunities for the population, thus generating well-being.

  An example of economic sustainability is ethical and sustainable banking, that only finances projects with the purpose of building a better world.

In conclusion, sustainability allows the creation of viable projects to cover the economic, social and environmental aspects of human activities. These pillars must be respected by companies, communities and people. The rapid growth of the population generates a negative impact on the environment, and with more population, greater demand for natural resources are needed to survive.

1.2.3 Environmental Sustainability

As mentioned in the previous point, environmental sustainability is the balance generated by the relationship between society and nature. This type of sustainability is one of the most important, to try to maintain the biological aspects with productivity and diversity over time in order to conserve natural resources. Thus, it is intended to consciously promote responsibility on ecological aspects and to grow human development through care and respect for the environment.

It is important to understand that the environmental aspect is an area of human development, but also the core of any form of development you want to reach. For the simultaneous practical implementation of some responsibilities in society, it is essential to define them by the different actors:

- **People**: Awareness and control over consumption habits that may negatively impact nature.
- **Base institutions**: Awaken interest and respect for life and nature.
- **Community and social media**: Inform, educate and generate reflection and awareness in people, strengthening the messages they give to create a common front that sustains positive environmental practices. This promotes and fulfills the creation of new and better ways of relating to the planet.

- **Scientific community**: Provide knowledge and tools and create useful technologies to make environmental sustainability possible.
- **Authorities and the State**: Political will and decision are necessary for the conditions on the use and care of natural resources to be respected and valued. Promoting research through the State's projects and programs together with private companies can serve to make decisions prioritizing some sectors and the most vulnerable regions. The establishment of guidelines and indicators of environmental impact measurement to study the proposal of public or private projects at the local and regional level and strengthen an environmental management policy through preventive programs and environmental education in the national territory and at the different levels of government.
- **Companies** must have a culture of respect for the environment and must comply with environmental standards and good practices as a social responsibility to attach the community and workers to the environment.

It can be concluded that the main objective of environmental sustainability is the conservation of natural resources and the development of alternative energy sources to reduce pollution and the negative impact on the environment, as well as the promotion of environmental culture through a well-established environmental policy to create awareness, hold the population responsible for the environmental impact generated by the activities, and reduce the impact on the environment in large quantities.

1.2.4 Factors that affect the environment

Environmental quality is understood as the set of characteristics of the ecosystem that generate an optimal environment but which are susceptible to any negative alteration on Earth.

In this section are mentioned the main factors that negatively affect environmental quality and with merely controllable impacts on natural resources. The **three most important and polluting factors** are:

- **Air pollution**: generated by the emission of toxic substances. With a high level of concentration and after a certain time of exposure, some air pollutants can become very dangerous to the point of causing serious disorders and death. It damages the environment, affecting tree flora, fauna and lakes. Over time the thickness of the ozone layer has been reduced and deterioration has occurred in buildings, monuments and other structures. Air pollution also causes haze,

which reduces visibility in national parks and other places, also creating obstacles for aviation.

- **Deforestation**: A large-scale destruction of forests by human action. Many hectares are degraded or destroyed every year, both cut or burned. Forests play a very important role in carbon storage. When they are destroyed, the carbon dioxide that affects the atmosphere contributes to global warming, generating very serious problems.

  For example, in temperate regions soils are less fertile. Tropical forests, however, are much more fertile and easily eroded, so the processes of deforestation are more destructive.

- **Excess and accumulation of garbage**: Generates bad odors, infections, diseases and environmental pollution. That said, many residues can be re-usable raw materials, which is why we must be responsible in generating waste.

  The shortage of raw materials and the protection of the environment are great reasons to recycle but unfortunately not everything can be recycled, so this waste must be eliminated. It is important to make selective collections, that is, to separate the waste to benefit the environment and that way recover raw materials through the generation of a sustainable development.

These are the factors with the most effect over the environment that increase the world's problem, destroy the environment, animals, the planet and even homes. It is important to know these problems and study new ways of acting to combat this issue.

1.3. Relationship between Innovation and Sustainability

Innovation and sustainability are two concepts that complement each other and can be inseparable. Innovation focused on the environment can create beneficial and sustainable processes and products for the Planet and society.

It is considered that sustainable innovation is one that positively affects the environment and society mainly through the use of technologies.
New technologies, in addition to favoring companies positively, are the engine for innovation to have an impact on society and the planet. It is also important to take into account the activity of research and sustainable development.

It should be noted that sustainable innovation refers not only to the creation of products and services but also to the improvement of more efficient and productive processes

internally speaking. For example, through the implementation of a sustainable innovation, the company *Telefónica* has managed to reduce an amount of energy consumption equivalent to 40,300 homes between 2010 and 2015, thanks to sustainable projects that have been implemented. In addition to favoring the environment, the company has achieved greater efficiency in its activities.

Innovation and sustainability are considered the future of companies because, time and time again, final consumers seek innovations from companies with the aim of improving their lives and minimizing the impact on the Planet.
On the other hand, from the point of view of the companies and thanks to evolution, the existence of new ways of creating activities that generate a more beneficial impact have been discovered.

2. EMPIRICAL WORK

Once the theoretical work related to sustainability and innovation has been carried out, in this section the study will be described and the automotive brands to be analyzed will be presented. For a more specific comparison, this analysis will be about the Spanish automobile market.

2.1 Description of the study: Sustainable engines in the automotive industry

The chosen theme for the realization of the comparative analysis between brands is **sustainable automotive**. During this study, different brands with a high degree of involvement in sustainability have been chosen.

Why has this theme been chosen? The main reason is the positive impact on the environment of innovation and the implementation of new sustainable ways.
On the other hand, the designs and materials used in each brand will be discussed, as well as the process of implementation and the way to communicate it to the world together with the benefits of both the product and personal. The interest of this study resides in the fact that transportation is largely responsible of adverse effects over the environment. However, other types of engines could allow the current situation to be changed, turning transportation into a more responsible and sustainable act.

Additionally, this study has been chosen to understand the current situation of the problem in the world and that there are ways to reduce it and generate different

benefits in society with the implementation of new strategies and innovations in both business and product.

2.1.1 Information sources

In order to carry out this comparative study between the different automobile brands chosen, the majority and main sources used, besides being the first ones that have been used, have been secondary sources. The information and data have been collected first from the webpage of each of the companies to have a generic idea of what each of them offer in terms of product and service.

Once the basic and necessary information has been collected in order to understand each of the companies, followed a deeper investigation through other expert websites in automotive as well as generic documentaries of sustainable automotive and other specific ones about each of the detailed brands, both in terms of production and work organization and organizational objectives.

On the other hand, to a lesser extent, primary sources have also been used. Not for the execution of the study of each brand, but to better understand the issue of sustainable automotive. As I am doing my university internships in a car dealership (*Belda Manises, S.L.*), I decided to interview its commercial and administration departments to have a clearer vision of the engines that are starting to be implemented and used within the sector.

Before offering the results, an introduction to the subject of sustainable automotion within the industrial environment is needed. Subsequently, the brands chosen for this work will be presented and analyzed.

2.2 Industrial environment: Sustainable automotive

The study *A Global Automotive Executive Survey* (KPMG, 2018), concluded that more than half of executives are convinced that the main driver of the industry is the efficient use of resources. Every day there is an increasing demand for renewable energy sources and less polluting activities in industrial sectors.

Sustainable mobility is becoming more prevalent in the automotive sector and is expected to continue to be promoted at least until 2025.

According to the same study mentioned above, "connectivity is clearly the most important prerequisite for the provision of services and additional content in the car and emphasizes the need for a fluid and easy-to-use man-machine interface inside the vehicle". That is why one of the most outstanding services directly related to the product is the reduction of combustion engines.

The automotive sector is always in process of technological development so they mention **three notable trends** for the coming years in this sector:

- **Evolution**: The progress and growth of the market which will offer more and more of the demanded products, betting on the production and commercialization of hybrid vehicles.
- **Revolution**: Electric cars are and will be the protagonists of the great changes in this market over the next years.
- **Disruption**: Driverless vehicles, connectivity and digitalization are considered as contributions to development. All this is brought by what is called the *digital ecosystem* of the vehicle. According to the *KPMG* study:
  "85% of managers in the sector believe that the future of the digital ecosystem will generate more income than the sale of the car in itself, and 76% agree that a digitized and connected vehicle will generate more revenue than 10 unconnected vehicles".

A european NGO dedicated to sustainable transport named *Transport & Environment*, foresees for 2021 that sales of electric cars with batteries will be multiplied by 5, as a result of the inclusion of this type of motorization.

Currently, there is only a small supply of electric cars for the large amount of demand, but it is predicted that it will be possible to facilitate a price reduction in this type of vehicle, as a result of the great competition in this sector

Going back to the study conducted by *KPMG* and focusing on electric mobility, it says that slightly more than half of the managers surveyed believe that due to electric motors' charging time, electric vehicles will not end up taking over the market.
However, new advances continue to emerge in the automotive sector that will allow a better and quicker charge of the battery, the emission of nothing but water vapor and the elimination of CO2 and other pollutants. An example is the use of hydrogen fuel cells.

In conclusion, new scenarios that revolve around innovation and technology from a sustainable perspective are increasingly being considered in order to satisfy consumers and benefit the environment in the automotive sector.

2.2.1 Types of sustainable engines

The automobile engine is evolving slowly but progressively thanks to new technologies, science and environmental awareness and as a result of the wear and tear of fossil fuels. But, what is the difference between these types of engines and combustion engines?

There are **three types of engines** considered sustainable: **hybrid, plug-in hybrid and electric**. The technologies of these engines are very advanced considered of high quality since they have been developed and worked with for more than two decades.

In order to better understand the comparison between brands that will be made in the following points, it is necessary to know the difference between these elements. For this reason, the characteristics of each type of vehicle will be briefly described:

- **Electric car** powered by an electric motor. The energy that is generated is stored inside rechargeable batteries implanted in the cars, transformed into kinetic energy.

- **Hybrid car**: the vehicle combines double motorization. One part of the motorization is internal combustion and the other is electric. The latter is supported by additional batteries to the main one. This type of engine has been used for many years and, therefore, different types of this engine have emerged:

- **Hybrid plug-in (PHEV)**: The batteries are rechargeable by means of conventional electric power, that is, through plugs.

What is the difference between a hybrid, an electric and a hybrid plug-in passenger car?

The plug-in hybrid vehicles have powerful electric motors that generate great acceleration capacity and can achieve speeds higher than the hybrids can. However, the difference between hybrid and electric is clearly more eye-catching: the electric only has an electric motor that is responsible for the impulse and traction, while the hybrids

have a double motor along with another extra internal or thermal combustion to reinforce its recharging and increase the autonomy and power of the vehicle.

2.3 Comparative analysis of the brands

This section will not focus on car groups, but rather some car brands will be analyzed within the automotive sector, those which maintain an environmental strategy and opt for the implementation of sustainable energy in their products. A comparison between them will be made further on.

The brands chosen to carry out this work with environmental strategies are: **Ford, Hyundai, Toyota, Lexus and Tesla.**

FORD: Ford is a global American company dedicated to the manufacture and marketing of automobiles, which was founded by Henry Ford on June 16, 1903.

In 2010, Ford was considered the fifth largest passenger car manufacturer in the European continent and was also ranked eighth in the *Fortune 500* list thanks to the global revenues obtained in the previous year.

This brand has been considered the second largest car manufacturer in the United States and the fifth largest worldwide based on its production during 2015.

Ford has introduced large-scale vehicle manufacturing methods and the management of an industrial work power created by a typified engineering that consists of sequences of manufacture, movements by assembly lines, that led to the creation of a new concept in 1914: ***Fordism***

HYUNDAI: It is a South Korean company founded by Chung Ju-Yung in 1967 dedicated to the manufacture and commercialization of vehicles.

Throughout its history, the cars of this brand were considered low quality cars, which made them work on the processes and improve the brand image.

In 2006, it reached the 10th place in the *OICA* world ranking and in 2007 it again had good comments and qualifications in the quality survey where the performance of the vehicles and the satisfaction of the clients that DJ Power performs are measured. It was positioned in the ranking to which brands such as Porsche belonged.

As a result of its efforts, Hyundai has positioned itself as the sixth largest automotive company globally and also the first within its country in recent years.

TOYOTA: This company is a Japanese multinational car manufacturing company founded by Kiichiro Toyoda in 1933.

From 2012 to 2016, Toyota was the largest car manufacturer in terms of production, although it closed the year 2018 in the third position of automotive manufacturers with the highest production and as the seventh company with the most global value of a general nature.

According to the *Global Automobile Report* (2018) regarding the previous year, carried out by the consulting firm *KPMG*, Toyota is considered the automotive brand best positioned for the immediate future, five years ahead of BMW and Tesla.
It has also been considered one of the most reliable manufacturers in the world.

Innovation is Toyota's strong point in the automotive sector: it was the first to implement and market the first automatic parking system, the first automatic gearbox of between 8 and 10 speeds, the real-time traffic guidance system or the climate control of four infrared technology zones. It is also a pioneer in mass production and commercialization of cars based on hybrid fuel technology or hydrogen fuel cell cars without generating CO2 emissions.

LEXUS: Lexus is an automotive brand founded by the Toyota Group in 1989 with the main objective of competing in the United States' market with different brands such as Mercedes-Benz, BMW and Audi, thus being classified as a high-end automotive brand.

The company has become the best-selling high-end automotive brand in the Japanese market and ranks among the 10 brands with the highest market value.

Lexus belongs to the Toyota group. However, it operates within its own design, engineering and manufacturing centers independently. As of the year 2000, Lexus implements hybrid auto-rechargeable technology in its automobiles.

In the first half of the year 2018, together with Toyota, Lexus led the hybrid passenger car market in Spain, achieving the goal that had been stipulated to reach by 2020: a 60 % of sales with the introduction of hybrid and electric cars as its central selection of vehicles.

At the end of that same year, the forecast of the incorporation of hydrogen batteries for 2020 was announced with the aim of sharing the basic components with Toyota and achieving an optimization of manufacturing and costs.

TESLA: The American brand based in California was founded by Elon Musk, Martin Eberhard, JB Straubel, Marc Tarpenning and Ian Wright. This idea arose from the withdrawal of all copies of the EV1 model from General Motors in 2003, but until 2006 the brand was not recognized publicly, kept hidden as a result of industrial espionage.

At first, no outside funding was sought, so the development of the engine, batteries, electronics and processors was handled by the company itself, and after many years of attempts, Tesla managed to create its first electric sports vehicle in 2006 (Tesla Roadster) with a lithium-ion battery.

Tesla is currently considered the most exclusive electric vehicle company with the most global autonomy in mass manufacturing, which makes it a reference for other automotive companies.

This brand manufactures and markets on its own account both vehicles and components and batteries, and it develops induction motors with a smaller mechanism than the rest of the engines. Its main objective is the commercialization of fully electric and affordable vehicles for all types of models: saloons, sports and compact.

Table 3: Introduction to brands summary

INTRODUCTION TO BRANDS	
FORD	American company founded by Henry Ford on June 16, 1903. **In 2010** Ford was the **5th largest passenger car manufacturer in the European continent, the 8th in the *Fortune 500* list** because the global revenues obtained previously. **In 2015** it was **the 2nd largest car manufacturer in the United States and the 5th largest worldwide based on the production.** Ford introduced large-scale vehicle manufacturing methods and the management of an industrial work power with a typified engineering. **In 1914** appeared the concept ***Fordism.***
HYUNDAI	South Korean company founded by Chung Ju-Yung in 1967. Its cars were considered low quality cars, which made them work on the processes and improve the brand image. **In 2006** it was **the 10th place in the *OICA* world ranking.** **In 2007** was **positioned in the ranking to which brands such as Porsche belonged**. Hyundai has positioned itself as **the 6th largest automotive company globally and the 1st within its country in recent years.**
TOYOTA	Japanese multinational car manufacturing founded by Kiichiro Toyoda in 1933. **From 2012 to 2016**, Toyota was **the largest car manufacturer in terms of production**. In **2018** it had **the 3rd position of automotive manufacturers with the highest production and was the 7th company with the most global value of a general nature**. Toyota is considered the automotive brand best positioned for the immediate future five years ahead of BMW and Tesla. Innovation is Toyota's strong point in the automotive sector.
LEXUS	It was founded by the Toyota Group in 1989 with the main objective of competing in the United States market with the high-end automotive brand. Lexus operates within its own design, engineering and manufacturing centers independently. In **2018** Lexus **led the hybrid passenger car market in Spain** and the forecast of the **incorporation of hydrogen batteries** for 2020 was announced.
TESLA	American brand based in California and founded by Elon Musk, Martin Eberhard, JB Straubel, Marc Tarpenning and Ian Wright in 2003 The brand is considered **the most debated, exclusive electric vehicle company with the most global autonomy in mass manufacturing**. It manufactures and markets on its own account both vehicles and components and batteries.

Source: Own elaboration

2.3.1 Principles, philosophy, product and market

This section will try to fully discuss some aspects of the brands to be analyzed, such as corporate principles and philosophy, the target audience and their products.

The first thing that will be discussed in this section will be the environmental strategy.

2.3.1.1 Environmental strategies

This section will describe the environmental strategy that each brand has established to understand what it is that has led them to make the decision to add a sustainable companion engine or implement another fully electric motor.

FORD: The main goal of its sustainable strategy is to offer customers great products, with commitment to saving fuel and reducing gas in models that cause *greenhouse* effect. These objectives form a fundamental part of the business, so research is constantly developed through evaluations and development of values consistent with the conservation and improvement of the environment.

In order to carry out these objectives, a sustainability project has been created within Ford. This is a project that is part of a complex interconnected system with the products, factories, personnel and communities in which it operates.
Ford considers sustainability a very important part of corporate strategy, which is why it is constantly working on intelligent and sustainable manufacturing within a wide range of low-consumption vehicles, including the latest technology, to guarantee a long-term success for the company.

Ford works continuously to reduce the environmental impact of operating systems and its vehicles solidly based on a climate change strategy. This strategy is about knowing mainly what happens globally in the environment so that greenhouse gases can be stabilized through the progression of the fuel economy, the use of alternative options and the energy efficiency of the facilities.

HYUNDAI: It is committed to sustainable development in production processes in order to be a global leader in environmental management. The environmental strategy of this brand encompasses all areas of the corporation such as its optimized distribution system. Other sustainable actions carried out by the company are the commuting of employees to work through the incorporation of sustainable buses, as well as carrying out meetings through video conferences to avoid trips to meeting points.

The negative impact on the environment begins with the process to obtain raw materials, all the way to the use of the vehicle. That is why Hyundai has worked on the manufacture of vehicles respecting the environment through research and development.

The **methods to facilitate the creation of the sustainable vehicle** made by Hyundai are:

- **Sustainable plant**: production plant called *Ulsan* located in South Korea is considered the highest ranked in the world. It works with efficient production systems that are respectful with the environment. There is a method of elimination of wastewater and a power generation plant that is generated by pressure difference and steam temperature.
- **Platform with diverse sources of energy**: better qualities to be able to build its three types of vehicles: hybrids, plug-in or electric hybrids. This platform saves time and energy and achieves maximum energy yields.

- **Sophisticated accumulators**: By means of a good technological development, lithium polymer ion battery packs are manufactured, which reduce the weight and increase the performance of this element. As a result, a more compact and lightweight energy storage system with higher performance and lower memory effect sensitivity is achieved.
- **Weight reduction**: Through different processes of metal treatment and assembly, it gives the body the standardized stiffness, resistance and safety and reduces its weight.
- **Biomaterials for construction**: use of recycled materials and biomaterials that respect the environment when working with them.
- **Efficient mechanics and aerodynamic load**: the implantation in the vehicles of a thermal engine and an electric one, it is possible to reduce the consumption and emissions by 7% compared to a conventional transmission. In addition, the vehicle's battery charges thanks to the air generated by the speed of movement.
- **Ease of recycling**: disassembly and separation of parts at the end of the life of vehicles is considered an easy recycling process for future productions

TOYOTA: The company is one of the first large companies that concentrate much of their work in the creation of methods to reduce the environmental impact within the industrial process. It is a pioneer in the use of plastics of vegetable origin and is considered the greenest brand.

Since 2015, the company has been working on its ***Environmental Challenge 2050*** project, which sets out environmental objectives to achieve in 35 years: zero CO2 emissions in new vehicles, life cycles, factories, reduction and optimization of uses of water, systems based on recycling and harmony with nature.

Toyota implements **initiatives** to achieve its environmental objectives:

- **Energy saving and recycling during manufacturing**. Design of vehicles in a way that facilitates the scrapping of their components. Each piece of the components of the vehicles are built with ecological materials.
- **Plants for the reduction and conservation of natural resources**. Manufacturing plants designed to carry out the activity in the most sustainable way possible. Through these production plants, it has been possible to reduce the use of water and electricity, in addition to eliminating waste that is sent to

landfills. On the other hand, methods of collecting and recycling water from rains have also been established.

- **Reward for the collection of old vehicles**: When the vehicle reaches the end of its useful life, Toyota proposes a compensation to the customer for the delivery of it, and thus, the vehicle is scrapped in the most sustainable way possible and its usable parts are recycled for the production of future vehicles.

LEXUS: It maintains a deep interest and respect for the ecosystem and with the objective of generating zero emissions, it has developed friendly work with the environment.

Environmental sustainability is the main challenge for the automotive industry, which is why Lexus has become aware of its responsibility in the creation of vehicles without damaging the ecosystem, and has become a role model for the rest of brands.

Technology is essential within the brand, it constitutes its philosophy not for commercial strategy reasons, but for providing progress and benefits to society and the environment. Great emphasis is placed on the innovation of sustainable technology to stay in a viable long-term sector with completely clean components for the atmosphere.

Therefore, the company decided to take a comprehensive approach to environmental leadership, and it is committed to achieve sustainable mobility. In order to achieve this, the company establishes **three main steps in its creation process**:

- The **development of the design and its products**, to achieve a minor impact on the environment. They plan and quantify progress through continuous improvement that encompasses all resources consumed, environmental pressures and the health of the products. Therefore, they encourage the use of recoverable materials and the use of easily recyclable components.
- The **production process**, which works with responsibility for the environment using the most sustainable methods known to the sector when developing the product. The logistics have been able to reduce the kilometers traveled by raw materials to the process plants and the assembly of parts, saving more than 1000 tons of CO2 through careful planning.
- **Recycling of vehicles at the end of their useful life**. To get rid of the vehicle there are authorized specialized treatment centers, if they meet all the

requirements given by Toyota and Lexus, for a proper breakdown that does not affect the environment.

TESLA: With the desire to change the world, it aims to curb global warming through the use of renewable energy. That is why Tesla decided to create a plan within the automotive sector, thus being able to achieve the creation and manufacture of sustainable transport.
The manufacture of its first vehicle was aimed at a restricted public, as only a person of high society could afford it, in order to raise money to finance the creation and manufacture of more affordable vehicles aimed at a more general public.

In order to be able to give such innovative vehicles a sustainable life, Elon Musk considers the following **characteristics of business** important:

- **Business model used by very few companies in which many people are involved in the care of the environmen**t. Tesla has managed to achieve a great change in the production and sale of vehicles, making them the most sustainable in the sector. In addition, it has created its own sales network from the website.
- **Additional services**. These vehicles are easily charged and there are more and more super recharge car parks implanted around the world every day, where the charge of the vehicle is free and takes less than an hour to complete.
- **New concept of technology and protection to the environment**. Tesla has decided to release the patents so that other companies can develop applications or electrical energy systems.
  This way, the change from combustion engines to electric ones can happen more quickly and give more movement to the electric car market.

Table 4: Sustainable characteristics summary

SUSTAINABLE CHARACTERISTICS	
FORD	Intelligent and sustainable manufacturing within a wide range of low-consumption vehicles, including the latest technology and guaranteeing a long-term success for the company. . Reducing the environmental impact of operating systems and its vehicles based on understand the environment to progress the fuel economy and the use of alternative options and the energy efficiency.
HYUNDAI	**Methods** to facilitate the creation of the sustainable vehicle: - Sustainable plant. - Platform with diverse sources of energy. - Sophisticated accumulators. - Weight reduction. - Biomaterials for construction. - Efficient mechanics and aerodynamic load. - Ease of recycling.
TOYOTA	-Environmental Challenge 2050 to reduce the environmental impact. **Initiatives**: - Energy saving and recycling during manufacturing. - Plants for the reduction and conservation of natural resources. - Reward for the collection of old vehicles.
LEXUS	Three **main steps** in its creation process: - Development of the design and its products. - Production process. - Recycling of vehicles at the end of their useful life.
TESLA	**Characteristics** of its business: - Business model used by very few companies in which many people are involved in the care of environment. - Additional services. - New concept of technology and protection to the environment.

Source: own elaboration

2.3.1.2 Business philosophy

In this section, we will provide corporate information about each company, such as its corporate principles and philosophy, as well as the mission, vision and values that are implemented in each of the organizations.

FORD: The company has an horizontal and vertical integration system to achieve a production that goes from the raw material to the final product through a chain of commercial distribution of owned agencies that have achieved an improvement of the methods, processes and products.

Based on the rationalization of production, an assembly line has been created to allow mass production which permits standardized production of a product in large quantities.

These **principles** established by **Henry Ford** are those used in the company that support the system:

- **Intensification Principle**: consists of the reduction of production time through the immediate use of equipment and raw materials together with a rapid introduction of the product into the market.
- **Economic Principle**: consists of minimizing the amount of raw material during the transformation process.
- **Productivity Principle**: To increase the production capacity of personnel through specialization and the assembly line, in such a way that the worker earns more in the same period of time and the company achieves a higher production.

The spirit of its creator Henry Ford "**facilitate the life of the clients**" is the philosophy of the company which has been used since its foundation to the present. As William Clay Ford, Jr. said:

"Progressive companies understand that environmental and social issues are business matters and understand that ultimately they can only be as successful as the world they are in. This has always been our belief in Ford Motor Company.
Our role as a collaborator with the community is a source of pride and it is an important factor in our success as a company with the intention to go one step further and help solve many of the problems our society faces".

- **Mission**: "To be part of a family with global diversity, with a proud legacy, passionately committed to providing products and services of the highest quality".
- **Vision**: "To become the leading company of automotive products and solutions".
- **Values**: "We do the right thing for our people, our environment and our society, but above all for our customers".

HYUNDAI: The brand seeks for the constant improvement of profitability of the operations to be able to lead future innovations within the automotive industry by investing and expanding the R+D department.
To achieve it, the brand works continuously to update its management system with a detailed strategy that integrates products, production and sales within each market. Through this strategy, it is possible to respond to the needs of customers proactively.

The company is substantially involved in reducing the impact of their vehicles in society, so the main principle defended by this organization is the **establishment of connection between company and customers**, thus fulfilling their vision which will be mentioned later.

The **principles** that Hyundai establishes are the following:

- **Orientation towards the client**: The automotive company seeks to achieve the best quality and service for maximum customer satisfaction.
- **Major challenges**: Take advantage of opportunities and create great challenges to achieve goals in ingenious ways.
- **Creation of synergies**: Collaborate in all departments of the organization to promote communication and cooperation between all parts of the company.
- **Respect**: Promote respect for all members of the company, for the cultures and customs of each worker. Encourage the sharing of skills and helping the rest to become a respected global corporate citizen

Hyundai has the philosophy "**Together for a better world**" in order to carry out its corporate responsibility. It seeks to approach customers in the best possible way and therefore, develops environmentally friendly technologies for people and the future, optimizing global management to give customers the best experience that a company and a vehicle can provide. With this philosophy, the brand is looking to give a new perspective to automobiles, innovate mobility solutions and become an eco-friendly company thanks to new technologies.

- **Mission**: "Import and distribute vehicles of high international quality standards, which meet the needs of our customers in each of the market segments where we compete and ensuring excellent after-sales service."
- **Vision**: To be the most dynamic and advanced company in the sector.
- **Values**:
    - Personal and social responsibility
    - Honesty and respect
    - Tolerance
    - Confidentiality
    - Justification and fairness
    - Teamwork

TOYOTA: It uses a production system currently called "**Toyota Production System**" as part of the philosophy of the company, which is based on the defectless manufacture of its products and on its employees assuming as a personal goal to carry out the production with no mistakes.

This philosophy aims to optimize all production processes in order to manufacture products with the highest quality at the lowest cost, considering workers as the most fundamental part of this process.
This creates excellence in manufacturing by generating the necessary production at the right time, with the best quality and at a competitive price.

The **principles** followed by the Toyota brand are:

- **Long-term philosophy**: Basing management decisions on a long-term philosophy, regardless of short-term financial objectives.
- **A correct process generates correct results**: Through the creation of processes in continuous flow to make problems come to the surface, the use of pull systems to avoid overproduction, the leveling of the workload without haste, the creation of a problem-solving culture to achieve excellent quality first, the implementation of standardized tasks to achieve continuous improvement and autonomy, visual control to avoid hiding problems and the use of reliable and fully-proven technology to service the workers and the processes.
- **Development of people and collaborators to add value to the organization**: With the understanding of work, the correct implementation of the philosophy and solidarity with the rest of employees for personal growth, the development of people and teams that follow the company's philosophy and respect the network of partners and suppliers.
- **Continued resolution at the root of the problems to generate a learning environment within the organization**: Seeing by oneself the problem to fully understand the situation, make decisions slowly and analyze by consensus and consciously consider all options to implement them quickly. Achieve making an organization that encourages learning through constant reflection and continuous improvement.

- **Mission**: "To offer our customers the prestigious Toyota brand cars based on quality delivery, after-sale tracking and quality service at adequate prices to

meet customer needs with technological and quality support, while achieving, at the same time, a return for our shareholders ".

- **Vision**: "We have leaders in each of our positions for the full satisfaction of our customers. We are a company focused on service, so we constantly innovate to exceed established standards. Our vision is long-term, since the relationship with our customers does not end with the sale of a car, it is precisely at that moment when it begins".
- **Values**:
    - Genchi Genbutsu. Go to the beginning for a correct decision making.
    - Kaizen Continuous improvement.
    - Challenges Long-term vision.
    - Teamwork.
    - Respect.

LEXUS: Lexus belongs to Toyota group, so the philosophy of optimizing production processes for the manufacture of high quality products at low cost and the application of the principles created by Kiichiro Toyoda is also part of this brand.

However, the **business principles** that remain within the Lexus company are:

- Continuously improve work and relationships with workers
- Increase product quality while reducing costs
- Optimize each stage of the supply chain
- Perfect anticipation ability
- Meticulous simplicity
- Integration of elegance
- Concern for the environment and development of new technologies

Lexus is globally recognized for its artisan technology that is incorporated into Japanese culture, therefore the essence of this company's philosophy is to **advance technologically in a humanized way**, through the creation of stunning and artistic designs without going too far.

- **Mission**: To be leaders in the sector, managing to overcome all environmental challenges.
- **Vision**: Achieve zero emissions with zero waste in all sections of the business through continuous improvement.

- **Values**: Achieve unparalleled manufacturing quality to give the vehicle a luxurious interior with state-of-the-art technology.

TESLA: The company comes up with the intention of creating the best electric car in the world and with the long-term goal of eliminating the combustion engine in the automotive sector by showing customers that an electric car can be the best in terms of consumption, ecology , security, design, features, technology and comfort.

In order to be able to manufacture such a revolutionary, innovative and electric car, the first step is to build a revolutionary factory and turn it into the only mega factory within the automotive sector, impeccable and clean that generates an equally impeccable and clean work environment that produces maximum efficiency.

The production chain is created with the most advanced and fully automated technology. The production is carried out by sophisticated and superefficient robots, in charge of motorizing the production program. Each of these robots is perfectly trained by human personnel in order to generate a highly coordinated chain.

That is why its executive director establishes two stages for the effective development of the business idea and its production:

1. **Total investment in the reputation of the company and its products.**
2. **Concerns about the benefits.**

The perfect technological mix between modern and innovative is sought. Function, style and performance is the combination used by Tesla when manufacturing its vehicles. It has become leader in the electric vehicle market.

Therefore, Tesla's business philosophy is the fight to **turn the world into one where clean and renewable energy is the identity of the automotive sector**.

- **Mission**: To be a leading company in accelerating the world's transition to sustainable energy through the production of electric cars.
- **Vision**: To be the most convincing innovation company of the 21st century to carry out the transition of the world to self-sustaining energy.
- **Values**: Respect for the environment and a commitment to innovation.

2.3.1.3 Brand and product

BRAND

FORD: The **name** of this brand originates as being simply the surname of its founder: Henry Ford.

The **logotype** of this brand is the signature of the brand name within a blue oval, which has evolved over time and was last modified in 2003. This logotype is meant to represent simplicity and elegance.

The **slogan** adopted by Ford as of 2012 is "*Go Further*" which replaces its previous "*Drive One*" or "*Feel the difference*". The company adopts this slogan not as a way to tell the world what the brand will be in the future, but announcing that it already is the future, as well as representing its reputation of quality.

HYUNDAI: The **name** is a physical representation of all its designs and models both internally and externally speaking. In Japanese, it means “modernity”.

This brand is represented by an H as **logotype**. Although at first sight it may seem to be merely the brand’s first letter, it actually represents its business values: trust and friendship between company and client. It also aims to reflect the silhouette of two people shaking hands, the representative and the client, giving it blue and silver colors for the portrayal of sophistication, creativity, reliability and excellence.

Since 2011, the company made "*New Thinking - New Possibilities*" its **slogan**, to summarize the concept of Modern Premium that, since that year, the company wants to demonstrate to customers.

TOYOTA: The **name** comes from its founder Kiichiro Toyoda. At first, the brand was going to be called Toyoda, but it was decided at the end to use Toyota, because it is much easier to pronounce in Japanese. In Japanese, you can write the name of the brand with only 8 strokes of a pencil, since it is simpler in calligraphy as well, and not only phonetically. In Japanese culture, the number 8 is thought to symbolise good luck, which is why the writing of Toyota in its original language has larger cultural significance than expected.

The **logotype** has changed many times over the years, but the current one was adopted in 1989. This logo is composed of three ellipses, two of them are intertwined and wrapped by the third ellipse. The two intertwined represent the customer and the product of Toyota, while the third, is the brand itself with its desire to expand and globalize.

Since 2004, the **slogan** utilized by the brand was "*Moving Forward*", but as a result of the search for a new target audience and the inclusion of new products (trucks or sports cars) it was changed to "*Let's Go Places*" in 2013.

LEXUS: As previously mentioned, Toyota created another car brand to compete within the high-end automotive sector in the United States market which is why the **name** "LEXUS" was chosen, due to the word's allusion to luxury, technology and distinction. That is why Luxury EXport United States are the words that represent the acronym "LEXUS".

The brand made the decision to create a simple and elegant **logotype** that represents both the name, brand image and products with the first letter of the chosen name in a way that suggests luxury and distinction as well.

The **slogan** of Lexus is "*The pursuit of perfection*" giving the brand that elegant touch it represents.

TESLA: The **name** of this brand is established as a tribute to Nikola Tesla, one of the greatest visionaries in history and the great precursor of alternating current and electromagnetism.

The **logotype** is closely related to another important brand within the automotive sector: Bosch. It is a scheme of a magnet with the coil between two fixed magnets. The Tesla logo looks like a T with what seems to be a crown at first sight. However, it is a part of an induction motor's cross section, which generates movement thanks to the phase difference between the magnetic fields of the coils.

Tesla does not have a **slogan**, but the closest thing to it is the mission, therefore its slogan could be "*the nature of speed.*"

Table 5: Brand characteristics summary

BRANDS	NAME	LOGOTYPE	SLOGAN
FORD	In representation of Henry Ford.	Blue oval with signature inside. Simplicity and elegance.	"Go Further"
HYUNDAI	Modernity	H: trust and friendship between company and client.Silhouettes of client and the representative shaking hands.	"New Thinking - New Possibilities"
TOYOTA	In representation of Kiichiro Toyoda	Three ellipses: two of them interlaced representing the client and the product. The third represents the brand.	"Let's go Places"
LEXUS	Luxury EXport United States	L: simple and elegant design.	"The pursuit of perfection"
TESLA	In representation of Nikola Tesla	"T" with a crown on it. Cross section of a part of the induction motor that generates movement by the magnetic field of the coils.	It does not have .

Source: our elaboration

PRODUCTS

In this section the products and price of the hybrid / electric range of each brand will be compared within the Spanish automobile market, since in each continent or country, each brand can offer different models. There will also be some brief commentary on some characteristics of the vehicle that may result interesting for both customers and potential customers. The images of the models can be found in Annexus 2.

FORD: As it can be seen on its spanish website, Ford only has one model that participates in the sustainable automotive industry: the Ford Mondeo Model.

The Ford Mondeo is a vehicle that maintains the design of the main line, simple, elegant and executive, giving it a more modern and technological touch. It is the first model manufactured by Ford within the European market. It is a car that provides efficiency, refinement and a high autonomy thanks to the advantages of its fuel engine and electric motor.

About Ford Mondeo models, in general terms they all have the same characteristics and the same fuel and electric motors. The only difference between the models is found in some details in the exterior design and some exterior and interior features.
On the website, the models are ordered starting at the most basic one to the most executive, but the only one that stands out due to its differences on the outside is the Titanium model, with outstanding exterior features such as the silver details that give this model a more elegant and modern touch.

HYUNDAI: In Hyundai's spanish website, they offer 8 models within the Eco-Line.
Some of the characteristics, such as the design of the vehicles and their engines, will be briefly commented on as with the previous brand, in order to know a little more about the products of this brand.

IONIQ Hybrid / Electric / Plug-in Hybrid: This model has an attractive external design, with elegance and sportiness. It is perfectly molded to provide aerodynamic efficiency in such a way that it has the ability to cut air at high speeds. The difference between each one is the engine. The hybrid model provides optimal driving efficiency through its gasoline engine and electric motor without contributing to the environment. The electric model, however, having only an electric motor, is a vehicle free of emissions. Finally, the plug-in hybrid model can be completely converted into electric, generating zero emissions with the use of its electric motor, or into hybrid, using both engines.

Tucson 48V Hybrid: Its design is striking and sporty with balanced proportions. It is labeled as an eco vehicle, as it is hybrid. It has a combustion engine assisted by an electric one, which reduces fuel consumption and CO2 emissions.

KONA Electric: Considered the best car in Spain in 2019 and the first compact SUV 100 % ecological in the European market, the vehicle offers a design with a robust and sculpted figure, giving it a fun look. As it name suggests, it is an electric car and, therefore, it is catalogued as a vehicle that provides zero emissions.

NEXO: This vehicle may be intended primarily for families, as it is a large car. The model has a futuristic and elegant design. It has the zero emission label, since it integrates a fuel cell that feeds the hydrogen vehicle and gives it enough power and energy to travel long distances.

TOYOTA: This brand is the most ecological car brand in the automotive market by excellence. However, not all of its products have an engine that facilitates the improvement of the environment, although most of its models do. It has not yet provided a vehicle with a fully electric motorization, but it is currently working on it.

As can be seen in the image provided by Toyota's website, the Eco models that are offered within its range of products are **Toyota Yaris, Corolla, Corolla Touring Sports, Corolla Sedan, C-HR, Prius** (5 and 7 seats) **and RAV4**.
Each and every one of them has the same combustion and electric motors. What makes them different is their designs. However, the Yaris model is also offered as a vehicle with only a fuel engine.

On the one hand, the **Toyota Yaris** model is the smallest and simplest of the entire range by design. It offers a certain modernity and high technology.

The new **Corolla** that the brand provides has three different models: **Corolla, Corolla Touring** and the **Sedan**. The **Corolla** model is the best selling car in the world, providing a stylish design with a sporty touch, also offering high technology.
On the other hand, we have the **Corolla Touring Sports** version, which is a more familiar car, showcasing a design with a bit more modernity and sportiness, but with the same technological characteristics as the main model. And the **Corolla Sedan**, which is the vehicle with the most executive and elegant design within the range, but maintains the same characteristics as the previous ones.

The **Toyota C-HR** stands out because of its perfectly molded crossover design. It is a family car that offers elegance and sportiness. It is a model that takes care of its aesthetics and stands out due to its high technology.

Toyota Prius is the first Hybrid model that created this brand. This vehicle provides an intelligent and technological design, also offering a great dynamic performance which makes it a very efficient vehicle. Toyota offers this model with both 5 and 7 seats.

The latest Eco model within Toyota's models is the **Toyota RAV4**, an SUV vehicle with a robust design, with a bold, elegant and urban silhouette providing a modern image.

LEXUS: It is noteworthy that all models offered by Lexus have the characteristic of being hybrids, so they all have an identic combination of engines. In general terms, each and every one of the vehicles is modern and elegant. It is a brand characterized by being luxurious and focused on a target audience of high purchasing power.

However, each one in particular has its own charm. Starting with the **CT** model, this vehicle provides a sophisticated and urban design with advanced technology, giving it an exclusive touch thanks to the perfected and detailed finishes.
The **UX** and **NX** models are crossover concept cars with sporty profiles, which also integrate the Japanese concept in the vehicle's finish. However, the **NX** model is considered a more Premium model because it has some more luxurious features inside the vehicle.

On the other hand we have the Berlinas, in this case the **IS** and **ES** models. The **IS** model is characterized mainly by the sportiness which inspires a seductive touch, while the **ES** model offers a more elegant, daring and provocative design, making it one of the most executive vehicles within the range.
Returning again to sporting design, the **RC** model is a coupe with an elongated design that, in addition to sportiness, also provides elegance and emotion, and as one of the main characteristics of the entire range, it also emotionally seduces those who see and drive it.

Returning to the crossovers, Lexus offers the **RX** and **RXL** models. The difference between these is the vehicle seats, since the **RXL** model has 7 seats while the **RX** model has only 5. These models offer an attractive design and comfort, being two of the most premium models within the brand's range.
Finally, we have the **LC** model with a very meticulous and hypnotizing design. This is the most sporty model that offers perfection, along with the **LS** model, which manages to be the most executive and luxurious of the brand, the most premium sedan car, exceeding the limits of technology.

TESLA: The most electric brand of all the aforementioned, being a new car company, has very few models within its range. However, they all have the characteristic of having a 100 % electric motor that generates zero emissions in both its driving and its production. In addition, all of Tesla's vehicles offer the optimum autonomy within the sector.

The first model marketed by the brand is the **Tesla Roadster,** with a very sporty design and very exclusive with high technology.

On the other hand, we have the luxury saloon, the **Model S**, one of the brand's best sellers, it is elegant, sporty, and maintains the main aesthetic of the brand, while the

Model X, which uses the same design as the **Model S**, is mainly characterized by its standing as an SUV type vehicle.

Finally, the **Model 3**, the latest model marketed by this company with the aim of reaching a wider audience, practically offers the same design as in previous models, although it is not as long, and it can be considered a sportier car than previous models, except for the Roadster, rather than elegant and executive.

2.3.1.4 Target and positioning brands

This section is focused on the target audience of each of the subject companies.
Each one of them has a different target audience, since some brands are directed towards a more generic or a more specific segment of the market. Afterwards, a positioning map will also be established in the Spanish market, taking as axes of study the quantity of sustainable products offered by the brand and the level of accessibility to its acquisition, that is, the price.

TARGET

FORD: It uses a segmentation strategy. Its target audience is male and female people between 20 and 60 years old and in the middle economic class.
This consumer is looking for comfort, stability and quality appropriate to the price as well as quick solutions to problems.

HYUNDAI: The company maintains a segmentation strategy in which its target audience is characterized as being in the middle economic class in an age range of 20 to 55 years.
Recently, this brand has decided to focus on another segmentation in order to get involved in the *premium market*.

TOYOTA: The target is a consumer, male and female between 35 and 65 years old with a medium-high purchasing power. This consumer is characterized by the seeking of safety, stability, strength, power and comfort in vehicles and also by being an eco-friendly consumer.

LEXUS: A young eco-friendly person with a medium-high purchasing power and looking for a vehicle with a perfect design that meets the standards of luxury and technology.

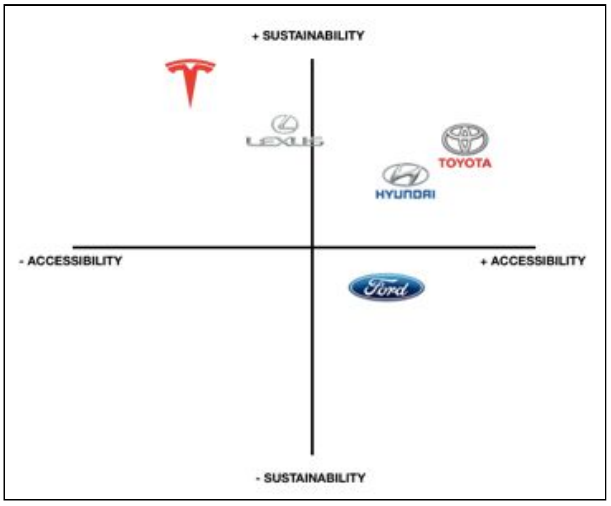
TESLA: The target audience of Tesla Motors is oriented towards a person between 20 and 40 years with high income, ecologically involved and interested in technology and luxury in products.

POSITIONING MAP

The positioning map is meant to give a generalized idea of the position of each company previously mentioned. It is necessary to establish the measures of the quantitative variables which qualify each brand in the attributes that have been chosen: in the horizontal axis is the accessibility of the product, while in the vertical axis is represented the number of models that are offered with hybrid / electric character (this axis, to name it more simply, will be called *sustainability*). This way, the analysis can be more easily and graphically understood.

In order to create a positioning map, the attributes of each brand in the eyes of the consumer have to be known. That is, to understand the consumer's line of thought when he thinks about that brand. For example, Toyota is considered a sustainable brand because of the number of hybrid models it has, just as Tesla is a very representative brand in sustainability due to its products. However, Toyota is much more accessible than Tesla, because, although the latter wants to expand its target audience and create cheaper models, only a person with a high purchasing power can afford a Tesla car.

Image 7: Positioning Map



Source: Our elaboration

It can be observed that some brands are more accessible than others.

All of these companies, except for Ford, have a wide range of hybrid models in the Spanish market (for example, the entire Lexus range is labeled as eco), and although

Tesla is a relatively new company, all of its models are the most ecological and most technological in comparison to the rest of the studied models, thanks to its electric motor that generates 0 emissions. Hence its position as the least accessible model of the market, since in addition to its engine, the performance of the vehicle contains great exclusivity and its models compete along with other high-end / luxury cars.

3. RESULT OF ANALYSIS

The main objective of this research is to carry out a comparative analysis between some automobile brands that have focused on working in the manufacture of automobiles through innovation with engines that positively reduce the impact on the environment. In order to carry out this comparative analysis, a handful of generic questions were established, and can be consulted in *Annex 1*.

3.1 Results obtained

Now, it is going to expose the results about the different parts of the analysis.

3.1.1. Environmental strategy

- **Reason for which the automobile companies introduce new systems of sustainable motorization.**

  The Law of Air Quality is established as precautionary and preventive action directed towards municipalities with more than 100,000 habitants and agglomerations. It facilitates the infrastructure to evaluate and report on the levels of pollution and air quality, as well as the elaboration of plans and programs to comply with air quality objectives, adopting, when necessary, measures of total or partial restriction of traffic and, if necessary, restricting the most polluting vehicles at certain times or in certain areas to protect the atmosphere. Likewise, Royal Legislative Decree 6/2015, of October 31, of Traffic (Official Bulletin of State, 261 of October 31, 2015), with reference to the field of atmospheric pollution by the emissions of motor vehicles, attributes to municipalities the competence of restricting the circulation of certain vehicles in urban roads for environmental reasons. It also establishes the possibility for local authorities to order the total or partial prohibition of access to parts of the road, in general, for certain vehicles, or even the closing of certain roads.

  Most of the selected brands introduce their sustainable products within the Spanish market as a response to the Anti-pollution Protocol imposed in the Community of Madrid. That is why, once we have introduced the main

environmental laws put in place in Spain, it is necessary to know what this protocol consists of.

Decree 140/2017, of November 21, of Governing Council (Official Bulletin Of Madrid Community 279, November 23, 2017), approves the *Framework Protocol* of action during episodes of high contamination by nitrogen dioxide within the Community of Madrid, with the aim of adjusting interventions to the principles of mutual information, cooperation and collaboration. This protocol have 10 parts that are explained in *Annex 4*.

- **Pioneering company in implanting a hybrid engine and its followers:**
  Ferdinand Porsche created the first hybrid car in 1900 by installing a generator and two 4cc electric motors.

  It was not until the 70's that another vehicle of these characteristics was created again. The brand was Buick, that implanted a 26 HP electric motor to its famous model Buick Skylark V8. At the beginning of the 90's an electric motor was installed in the Audi 100 Avant Duo model.

  Despite not being the pioneer in its manufacture, Toyota can be considered the pioneer in the elimination of diesel models and the first brand to work in the production of more hybrid car models. When the Japanese brand began to market its electric vehicles, diesel vehicles were booming in Europe, so it took ten years to introduce the Auris' hybrid model in the European market and another two years to introduce the hybrid Yaris model.

  Their competition did not bet on hybrid technology, except for Honda that tried it with its Civic, Jazz and CR-Z models. On the other hand, Lexus was the first company that decided to hybridize its entire range and eliminate all diesel versions.

  According to a survey carried out by *Transport & Environment* (2018), "Spanish people are the Europeans who have the greatest disposition to buy or get into a lease for electric cars or fuel cells someday."

  It is expected that for the decade 2020-2029, 25% of vehicle sales will correspond to plug-in hybrids or pure electric, but the rest of sales will be almost

completely hybrid models. In the background will be the gasoline models and finally the diesel ones, these being possibly SUVs, big saloons, and light industrial cars, the last car types for which diesel models will disappear.

3.1.2. Business philosophy

- **The focus of innovation in each company**

FORD: It is a company that is already well-established within the automotive sector. They focus innovation towards the design, sophistication and advanced technologies of their products, creating a product compatible with respect for the environment.

The main focus of the innovation is mainly on the **technology of its products**, so that a safer vehicle can be created. For example, installing airbags in the belts, so that after an impact, a cushion is deployed in less than 40 milliseconds, or systems for parking and exiting parking spots and implementation of cameras, radars and sensors in the vehicle to detect pedestrians in the distance.
Other innovations, such as wireless connectivity, are an added service, like the Ford SYNC and MyFord Touch and other energy storage solutions in sustainable vehicles.

HYUNDAI: The brand orients its innovation towards **the products, services and the marketing strategy**. It seeks to become the market leader by the year 2020, so it sees necessary to innovate its offer to meet all the needs of consumers who demand innovation, so they have to create new products and flexible and convenient services.

For this, the Asian company has implemented return guarantees and subsidy programs for the unemployed that are directly aimed at the welfare of consumers in order to establish a long-term relationship with them. An example is the MOVE service, a financing program for people with different needs in services and mobility.

TOYOTA: It goes beyond innovation with its **products**, but also innovates in its **production system**. It is considered as the brand that invests the most in

Research and Development. To do that, it combines efficiency and quality in its products and in its Toyota Production System.

Toyota is committed to intelligence for innovation. This intelligence is provided thanks to the process of collective aggregation, where every worker participates and collaborates both in the detection of problems and the contribution of ideas for the rapid resolution of each one.
This brand works on sustained and long-term innovation, which is why it is working hard in the study of consumer needs, since in the case that the demand changes, the product must be transformed quickly in order to attend urgently the demand for these variations.

LEXUS: Lexus focuses innovation on its **products**. It works on constant development to get the most avant-garde technology and apply it in the most unexpected and original ways, that the rest of the competition does not use.

The engine is analyzed frequently by means of scanners, so that faults can be detected quickly and with great precision in order to improve them and innovate them. They study new ways and develop new assistance systems to increase the safety of vehicles with the most respectful to the planet solutions, thanks to the use of ecological materials.

Through virtual reality, the quality of the tests that are carried out has improved and valuable information is collected to better the technology until it is perfected.

TESLA: Tesla is considered by Forbes one of the most innovative companies in the world. They use a large number of robots to work within the factory.

Tesla uses disruption to differentiate itself. The brand started creating products difficult to imitate that exceed the critical attributes of existing products at a higher price than the rest, collecting more profitable customers than the competition. A good example of this type of disruption is Apple’s launch of the iPod, a product that surpassed Sony's popular Walkman.

This way, they get an advantage in the middle and high range of the market when their competitors want to reach the level of Tesla, and therefore they hold a good part of the industry.

Tesla is also highly innovative in its team and work process, since most automotive companies seek to create value through an established product. Tesla, however, works in conditions of radical uncertainty, so it focuses on reaching a high speed and agility in its process through its own and perfectly integrated information system. This allows quick responses to be achieved through communication. For this purpose, the work team is composed of people with high capacity for complex problem-solving and learning in contexts of uncertainty.

3.1.3 Brand and product

- **Brand Value**

Brand value describes the value that a recognized brand has, based on what it can generate for a period of time. For example: the profitability of the products s understood as brand value.

In this section will be established the brand value for each one of the subjects through the information provided by the *Interbrand* consultancy regarding the last year in which data was collected:

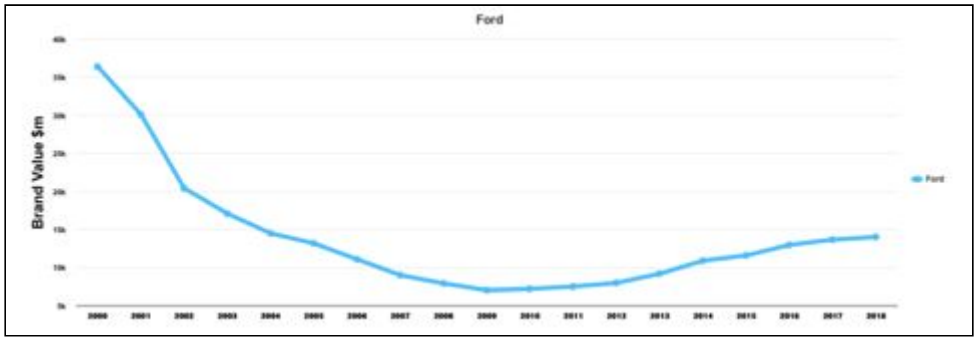
FORD:

Image 1: Ford Brand Value

Source: Interbrand Web

According to Interbrand, Ford is among the 100 most valuable brands worldwide, positioning itself at number 35 at the end of 2018 and increasing its value by 6 % compared to the previous year. At the closing, its value consisted of 53.404 million dollars.

Image 2: Growth of Ford



Source: Interbrand Web

Its growth has been decreasing throughout its existence, but since 2012 it has been growing slowly but progressively.

HYUNDAI:

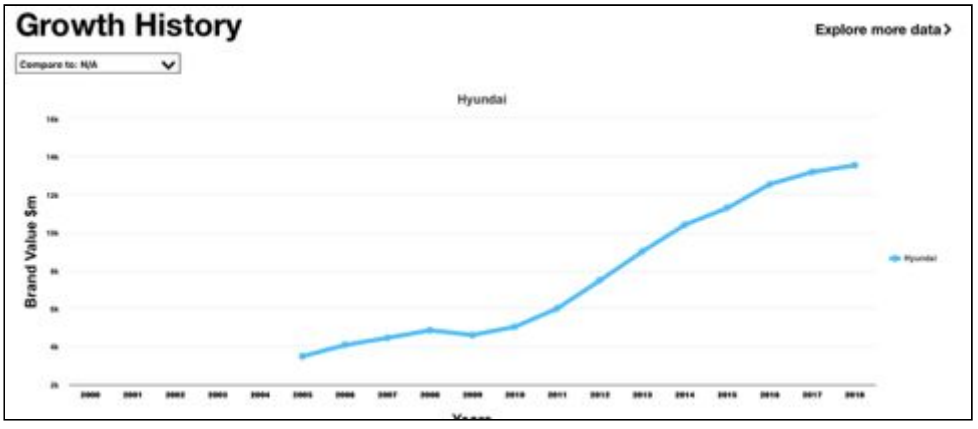
Image 3: Hyundai brand value

36	HYUNDAI	Automotive	+3%	13,535 $m

Source: Interbrand Web

Hyundai is ranked number 36 among the 100 brands with the most brand value according to Interbrand. It increased its value by 3 % in 2018, compared with 2017, and the brand closed the year with 13.535 million dollars.

Image 4: Growth of Hyundai



Source: Interbrand Web

Since 2005, Hyundai has been climbing positions progressively and steadily among the 100 best brands and with the most value worldwide.

TOYOTA:

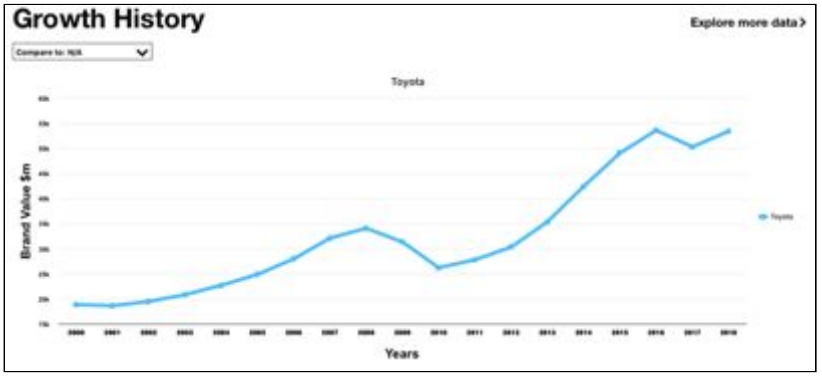
Image 5: Toyota Brand Value

2018 Rank	Brand	Sector	Change in Brand Value	Brand Value
07	TOYOTA	Automotive	+6%	53,404 $m

Source: Interbrand Web

As can be seen, during 2018 Toyota has grown 6 % with respect to the previous year. It is positioned as the 7th most valuable brand worldwide. Also, it can be seen how its value has changed during the existence of the brand in the following image:

Image 6: Growth of Toyota



Source: Interbrand Web

The graph shows that Toyota has been growing rapidly and progressively throughout its history, which makes it a powerful and strong company.

LEXUS: The consultancy Interbrand has no information on Lexus, but it was possible to collect some data thanks to Forbes' list of best brands.

Image 7: Lexus Brand Value

Source: Forbes List Web

According to this magazine, the brand is ranked 69th in its ranking and is positioned as the fourth largest luxury brand in the world, behind Audi. The global volume of Lexus fell by 6.2 % at the end of 2016, while achieving four consecutive years of record sales.

Unlike Interbrand, Forbes does not provide a growth chart, so it was impossible to showcase one for this brand.

TESLA

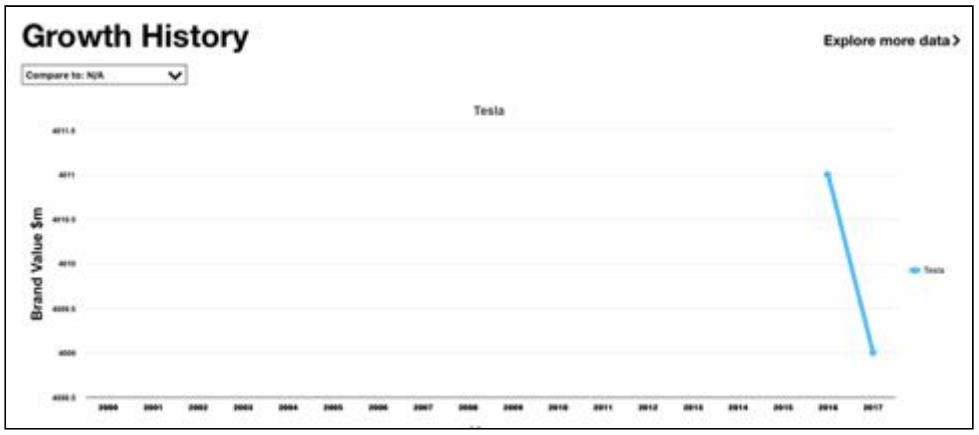
The last record of Tesla by the Interbrand consultancy is from 2017, since this brand was among the 100 companies with the largest brand value.

Image 8: Tesla Brand Value

Source: Interbrand Web

In 2017, Tesla was on the edge of falling off the ranking, but it managed to position itself in the 98th place. There is no figure of comparative growth to previous years. Tesla registered a brand value of 4,009 million dollars.

Image 9: Growth of Tesla



Source: Interbrand Web

However, in the graphic of the growth history of Tesla it can be seen how its growth falls from one year to the next. However, the reason for this is that it is relatively a new company so Tesla is still investing a large part of its income in the creation of new models and the improvement of those that have already taken off.

- **Price, Communication and Distribution**

  The price range of each brand is established taking the basic models. Added optional specifications would increase the prices, but those are not taken into account. On the other hand you will be shown the communication and the distribution of the brands as well.

Price

FORD: Among the four models of Ford Mondeo hybrids offered in the Spanish market, the prices range between roughly 30,000 euros to 40,000 euros.

Table 6: Ford Hybrid Prices

FORD HYBRID MODELS (ECO LABEL)	PRICES
TREND	From 29.924,91 €
TITANIUM	From 33.199,88 €
TITANIUM HYBRID	From 37.100,21 €
ST-LINE	From 39.899,84 €

Source: Adapted from Ford official web

HYUNDAI: This brand has a greater offer of hybrid and electric models than Ford. The prices of these vehicles range from around 21,000 euros to 69,000 euros.

Table 7: Hyundai Hybrid and Electric Models Prices

HYUNDAI HYBRID MODELS (ECO LABEL)	PRICES
IONIQ HYBRID	From 20.990 €
TUCSON HYBRID 38V	From 24.115 €
HYUNDAI HYBRID/ELECTRIC MODELS (0 EMISSIONS LABEL)	**PRICES**
IONIQ ELECTRIC	From 29.975 €
IONIQ HYBRID PLUG	From 28.225 €
KONA ELECTRIC	From 36.100 €
NEXO	From 69.000 €

Source: Adapted from Hyundai official web

TOYOTA: Toyota's model range is very wide because almost all its models are hybrids. This brand has both affordable vehicles and vehicles for customers with a slightly higher purchasing power. Its prices range from 11,000 euros for your most economical vehicle to 31,800 euros, without including extra benefits.

Table 8: Toyota Hybrid Model Prices

TOYOTA HYBRID MODELS (ECO LABEL)	PRICES
YARIS	From 11.000 €
COROLLA COROLLA TOURING SPORTS COROLLA SEDAN	From 20.850 € From 22.100 € From 21.350 €
TOYOTA C-HR	From 24.850 €
PRIUS	From 29.990 €

Source: Adapted from Toyota official web

LEXUS: All of its products are hybrids, but its prices are higher than previous brands. Their models cost between close to 25,000 euros and 120,000 euros, also without added features.

Table 9 : Lexus Hybrid Models Prices

LEXUS HYBRID MODELS (ECO LABEL)	PRICES
CT UX IS	From 24.900 € From 33.900 € From 25.900 €
NX	From 41.900 €
ES	From 45.000 €
RC RX RX L (7 SEATS)	From 48.100€ From 73.900€ From 78.300 €
LC LS	From 120.000 € From 112.000 €

Source: Adapted from Lexus official web

TESLA: The prices of these vehicles, which are all electric, depend on whether you add its "ludicrous mode" with increased performance or not, which is why every model has two prices: one without "ludicrous mode" and another with. The prices of these vehicles depend on their model and range between 60,000 and 172,000 euros.

Table 10: Tesla Electric Models Prices

TESLA ELECTRIC MODELS (0 EMISSIONS LABEL)	PRICES
MODEL S	From 89.730€ From 98.380 € (Performance Version)
MODEL 3	From 59.680 € From 69.480 € (Performance Version)
MODEL X	From 93.880 € From 102.380 € (Performance Version)
MODEL Y	From 62.980€ From 70.980€ (Performance Version)
ROADSTER	From 170.000 €

Source: Adapted from Tesla official web

Communication

Almost all automobile companies perform the same communication activities: television advertising, personal sales, sales promotion, sponsorships and online marketing. Further on, a table with the different communication strategies used is shown, with the companies that use them marked with a cross. Afterwards, some examples are given as a way to verify the table's information.

This infographic shows that Tesla does not use an advertising or sponsorship strategy, since the brand does not make large investments in communication,

but instead uses a more "*organic*" strategy that allows it to be talked about without having to pay for it. It achieves so thanks to the generation of content through third parties, social networks, allowing content to emerge naturally, or closing agreements with other major brands in terms of sustainability. This way, the brand gets to be the center of attention without spending millions of dollars on advertising.

Table 11: Communication Strategies of Brands

	ADVERTISING	PERSONAL SALE	PROMOTION SALES	SPONSORSHIP	ONLINE MARKETING
FORD	X	X	X	X	X
HYUNDAI	X	X	X	X	X
TOYOTA	X	X	X	X	X
LEXUS	X	X	X	X	X
TESLA		X	X		X

Source: Our elaboration

To continue, here is an example of each of these brands on the strategies used:

Advertising:

Image 10: Examples of advertising of brands

Source: Official webs of brands

Personal Sale: It is carried out by all the companies observed by this analysis, since all these companies have physical retail locations where both sellers and buyers maintain an oral conversation. The seller must disclose certain information about the vehicles so that the buyer receives all of that information immediately.

This type of promotion is intended to inform buyers of the characteristics of the product and the benefits it offers in order to persuade the potential consumer to buy the vehicle through argumentation.

Promotion Sales: Some of the analyzed brands have a section of promotions on their websites, in which they offer discounts on some vehicles, more affordable methods of payment for the consumer or the acquisition of other products / services with the purchase of a vehicle. These promotions are usually modified every month or are available for a short period of time, usually renewed once the offer expires.

However, Tesla still does not have a promotions tab on its website, but rather implements from time to time some sales promotion strategies, such as a discount of 1,000 dollars to buyers who would convince a friend to buy a model of the brand, who would also receive a 1,000 dollar discount on their purchase.The images related to the promotion sales of these brands are available in *Annex 3*.

Sponsorship: The following images are examples of some sponsorships of the brands.

Image 12: Examples of sponsorship of the brands

Source: Different marketing office sources

Online Marketing: All of the companies analyzed use an online marketing strategy using the different social networks available today. Every one of them owns a personal account in which they post videos, advance future releases and images and interact with their target audience. The social networks most used by these brands are YouTube, Twitter, Instagram and Facebook. Youtube is also used to show how the brand works and the operation of their vehicles, for example.

Distribution: All companies have retail locations in official dealerships of each brand. However, all brands except for Tesla also distribute their products through intermediaries, dealers that sell brands of the same group to which they belong. For example, an unofficial dealer that sells Toyota and also sells Lexus, or other non-official outlets where different and unrelated brands are sold.

However, Tesla has the peculiarity that its vehicles can also be purchased through its website, which was the first distribution strategy that was implemented. Even if its production is not yet underway, a vehicle can be reserved with the payment of the amount required by the company.

3.1.4. Target and positioning of brands

- **The best hybrid / electric cars and launch of new powerfully ecological vehicles.**

  Nowadays, there are many brands that offer the option of hybrid motorization, but there is still few options of electric vehicles.

  Every year the automotive brands struggle to get one of the many prizes in the sector. One of these is the *Next Green Cars Awards*, with the objective of rewarding vehicle manufacturers that show the greatest commitment to the environment and the best performance while maintaining sustainability.

  Next, down below are **the four best valued sustainable vehicles** within the sector at the end of the year 2018:

  In the first position is one of the brands analyzed in this work: Hyundai with its **Hyundai Kona Electric** model. That model got to be valued as the best family launch of 2018 and the best sustainable car. It is a very versatile vehicle because of its autonomy, very close to the performance of combustion cars.

  The second place is taken by the **Smart EQ fortwo Coupé** which stands out for its simplicity and intelligent and efficient technology, that makes it easy to drive and maneuver with around the city. It achieved to reduce its charging time from 2.5 hours to 40 minutes during the year.

  The third place was won by the **Renault Zoe R110** model. It is the best supermini car of 2018 because of its redesign, a great improvement in the

engine and the increase of its autonomy, that give this new version of the model more ability to be used in long-distance trips.

In the Premium category, not to be forgotten, is the **Jaguar I-Pace*,*** which has managed to position itself as the first electric car manufactured by the British brand, designed to compete with big names such as Tesla, Mercedes-Benz or Audi.

With respect to the **new electric and ecological vehicles**, the *Geneva Motor Show* displayed some of 2019's protagonists with some concepts that will begin to be manufactured starting this year.

The first vehicle to mention is a concept presented by Audi, belonging to the family e- tron. It is the **Q4 e-tron** model, which is estimated to be released for the general public by 2020. In addition, this brand also presented other models in the same row of plug-in hybrids: *A*8**,** A7 Sportback**,** A6 and Q5, that increase the electrical range of cars able to exceed the 40 km/h mark..

On the other hand, the most prominent vehicle in the range of plug-in hybrids is the **BMW X3 xDrive30e**. This vehicle accompanied the presentation of renovations in the BMW 3 Series and BMW X5 models, giving them greater autonomy as 100 % electric, while the BMW 7 Series suffered changes in its hybrid plug-in variants.

The next vehicle had been presented a few months ago in the US market. However, the Geneva Motor Show was chosen for its debut at the European market. It is the new **Kia e-Soul,** which maintains its design with cubic lines while including mechanics for a very high autonomy with the use of its electric engine.

One of the biggest protagonists of this hall was the ***Peugeot 208***, with the presentation of its completely electric version with an autonomy of 340 kilometers.

The Spanish brand Seat presented a concept of vehicle that is currently under development: **Seat EL-BORN**. It consists of a compact all-electric vehicle

aiming to achieve an autonomy of 420 kilometers and fast recharges of 80 % in just 47 minutes.

4. CONCLUSIONS

To close this comparative analysis, the obtained results will be summarized in this section and will be complemented with conclusions, limitations and future research to be undertaken.

4.1 Summary of results and recommendations

Through this analysis, it has been possible to observe the theoretical concepts shown in chapter one (innovation and sustainability) in a more practical way. After the whole process, the main ideas can be concluded as being:

Environmental strategy:

Innovation appears in all areas, but the awareness of environmental problems with serious repercussions for both the world and society makes companies seek and achieve innovation in order to attain alternative ways for the product and its development to be beneficial for the environment.

This shows how the exploitation of a business activity does not necessarily destroy the planet and that there are other ways of generating products with a more favorable impact for the environment. In my opinion, the best environmental strategy among the ones adopted by the brands analyzed is the one developed by Tesla. From the beginning, Tesla has worked on the development of a sustainable process and product, through the use of highly sophisticated technologies.

Business philosophy:

Obviously, each company has its particular business philosophy. However, some of the mentioned above stand out for their serious commitment to the environment, while using this same strategy to avoid falling behind in the sector. For example, Tesla, Toyota and Lexus seem to have a sincere commitment to the environment because of their philosophy and their pursuit of innovation and better technology to achieve their ecological objective. However, Ford, and to a lesser extent Hyundai, seem to be committed to the environment as a way to advance and develop within the sector.

Target audience and positioning:

Most automotive companies have joined the sustainable movement, which makes competition within the sector even higher because almost all of them start to implement these new forms of motorization and energy at the same time, without achieving competitive advantages. However, there are some companies like Tesla that can maintain their long-term positioning, thanks to an advanced development of these sustainable technologies that allow them to make constant changes while the rest, who focus on minimizing costs, are not able to reach companies with highly developed sustainable products.

Brand and product:

All the products that have been talked about are characterized by their growing innovation and their implementation of high technologies to achieve an eco-friendly and sustainable product in the short, medium and long term. Every day, innovation makes these products, in this case vehicles, less and less harmful to the world, as well as easier to handle thanks to the autonomy that is being achieved.

Little by little, vehicles with diesel engines will be eliminated and hybrid and electric products will be more affordable for the public, so the negative impact on the environment will be greatly reduced.

4.2 Limitations and future research

The limitations for carrying out this analysis cannot be ignored and future research cannot be forgotten either.

This analysis has found great limitations. Firstly, because it is a comparison of several companies, which means that the information collected may be too scarce or may be too abundant in comparison, which makes it difficult to reach specific conclusions. Also, very large companies being the center of study, it is very difficult to contact workers within the companies that can provide valuable information. However, myself having underwent an internship within the sector facilitated the task of understanding the subject matter.

Taking into account future research, with the aim of expanding the scope and improving the results of this study, it would be interesting to observe the evolution of pioneering companies in the implementation of these sustainable systems, with great technological advances, as well as those that encourage research and development

within the automotive industry. The rest of companies that follow them should also be considered as subjects to analysis, especially focusing on their reaction to the advances incorporated by pioneering companies. This way, it will be easier to identify which ones are truly committed to the environment and which ones use the strategy as development without looking away from the reactions of the competition.

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7. ANNEXES

Annex 1: Questions related to the analysis

The main objective of this research is to carry out a comparative analysis between some automobile brands that, through innovation, have focused on working in the manufacture of automobiles with engines that positively affect the impact on the environment. In order to perform this comparative analysis, it has been necessary to establish some generic questions:
Why has it been decided to implement a sustainable motorization system in automobiles and is its commercialization rising within the Spanish market?
How has the innovation process of each brand been carried out?
How do you operate within the automotive sector to achieve market leadership?

These questions are directly related to the main topics introduced in the first and second chapters, taking into consideration the Spanish market and its environmental laws.

In order to carry out the main objectives, it has been necessary to take into account the information collected throughout the investigation and some specific questions have been established directly related to each of the sections of chapter two, which will also respond to the three questions raised in the previous paragraph.

Environmental strategy:
Q1: What is the reason that leads the automobile companies to introduce new sustainable motorization systems?
Q2: Which was the pioneer company in implanting a hybrid engine and who followed the idea afterwards?

Business philosophy:
Q1: Where is innovation focused on at each of the companies?
Q2: How does innovation work?

Target audience and positioning:
Q1: Which models have been considered as the best hybrid / electric vehicles?
Q2: What have been the most amazing presentations for the year 2019?

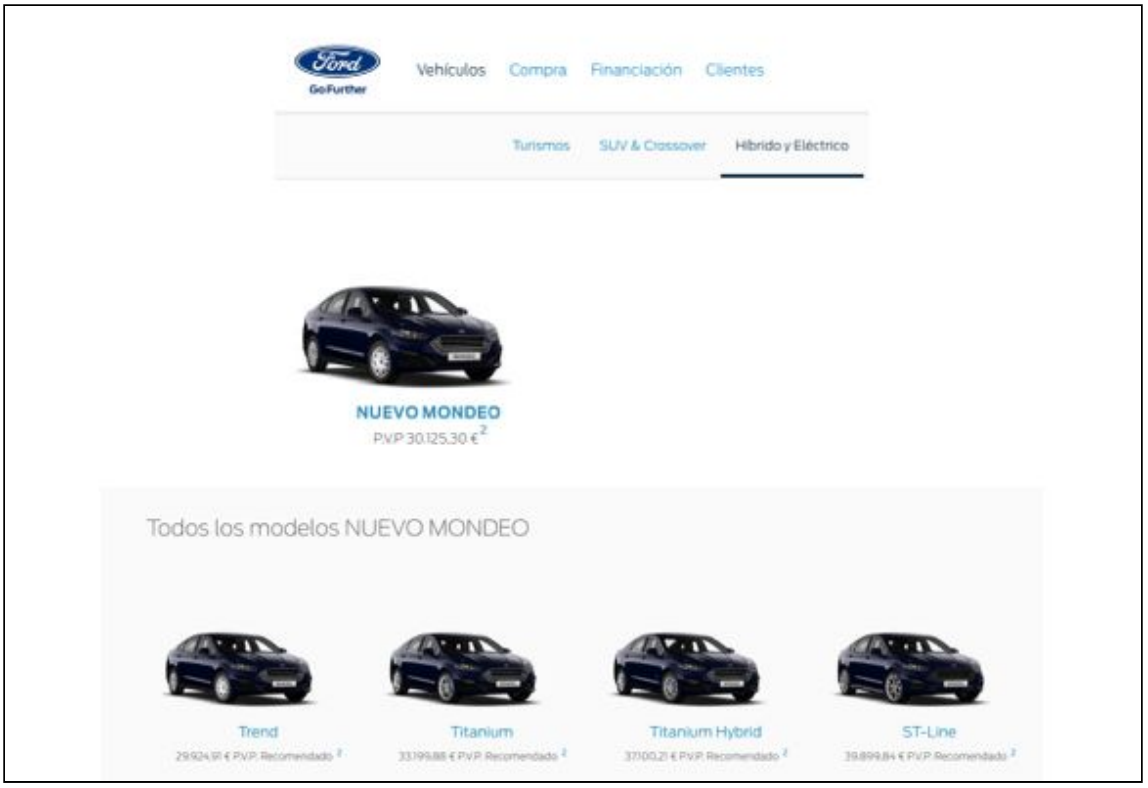
Brand and product:

Q1: What is brand value?

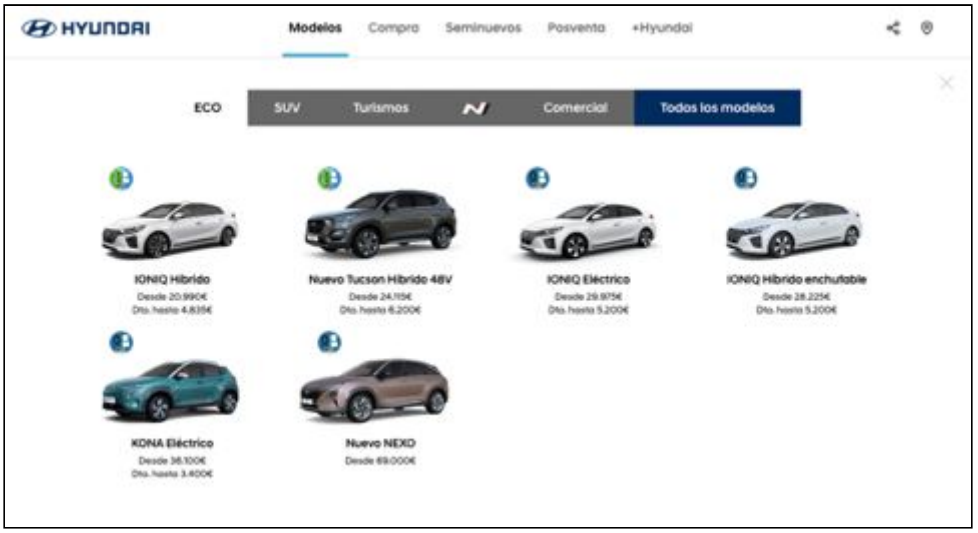
Q2: Price, distribution and communication

Annex 2: Hybrid and electric models of the brands

FORD



HYUNDAI



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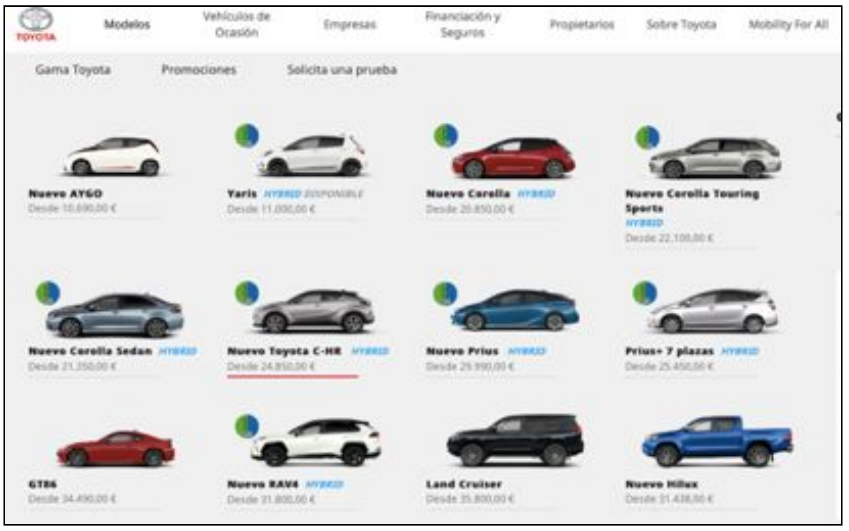

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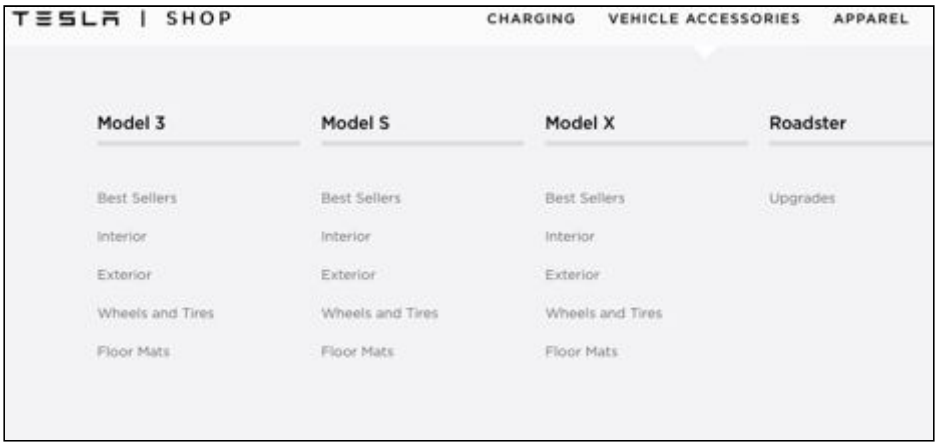
TESLA | SHOP
CHARGING
VEHICLE ACCESSORIES
APPAREL
Model 3
Best Sellers
Interior
Exterior
Wheels and Tires
Floor Mats
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Best Sellers
Interior
Exterior
Wheels and Tires
Floor Mats
Model X
Best Sellers
Interior
Exterior
Wheels and Tires
Floor Mats
Roadster
Upgrades

Annex 3. Sustainability protocol of Madrid.

1. Episode of contamination. when there is an unfavorable meteorological situation and the registered level of contamination exceeds -or if it risks exceeding- the established levels.

2. Zoning of the City of Madrid. The city is divided into five zones considering the distribution of the population, air quality monitoring systems, and the structure of the road network.

3. Definition of the levels of action according to the concentrations registered or foreseen, establishing the levels as precaution, caution and warning.

4. Possible **scenarios** that are defined when, due to an unfavorable weather forecast, an episode of contamination is considered initiated.

Description of the measures.

A. **Traffic measures**:
    - **a.** Reduction of the speed limit to 70 km / h in the M-30 highway and its accesses.
    - **b.** Prohibition of the parking of motor vehicles in the place and time of the SER, with the exceptions provided.
    - **c.** Prohibition of circulation of motor vehicles, including mopeds, according to the *Vehicle Register of* the *General Directorate of Traffic* with the exception of vehicles that are classified by the aforementioned Registry as "*ZERO EMISSIONS*" or "*ECO"*.
    - **d.** Prohibition of the circulation of free taxis and leased vehicles with driver (VTC) while not in service, except for Eurotaxis and vehicles that have the environmental classification of "*ZERO EMISSIONS*" or "*ECO*" in the *Vehicle Register of the General Directorate of Traffic*.
    - **e.** Autotaxis vehicles without clients that provide services contracted through radio stations or telematic means.

B. **Measures to promote and reinforce public transport** in which public transport will be promoted, and citizens will be informed of the benefits generated by the use of these.

5. Activation and deactivation of established measures such as measures for speed limit reduction and recommendation, as well as parking and circulation restrictions.

6. Exceptional situations, when all the established measures have been applied and the level of concentration of carbon dioxide has not been reduced.

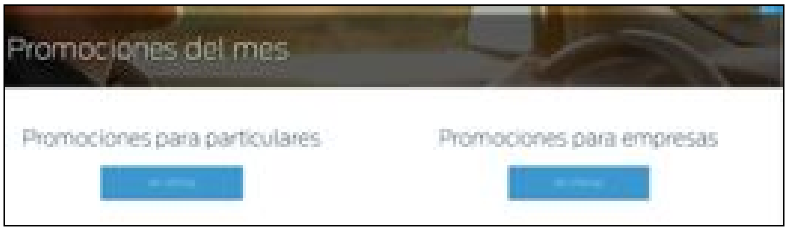
7. Coordination of operations. An Operative Group responsible for the application of the Protocol is provided.

8. Annual review with the aim to improve the effectiveness through the experiences collected.

9. Derogation that approves the protocol on January 16, 2016, and comes into effect that same day.

Annex 4: Promotion sales of brands

FORD:



HYUNDAI:

TOYOTA:

LEXUS: